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SCIENCE

MAY 18, 1951

VOLUME 113 NUMBER 2942

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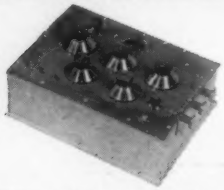

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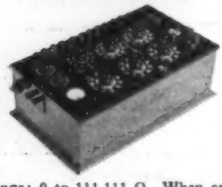

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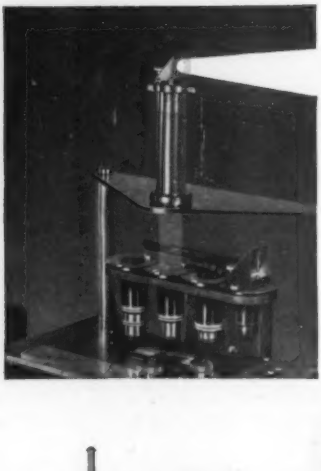

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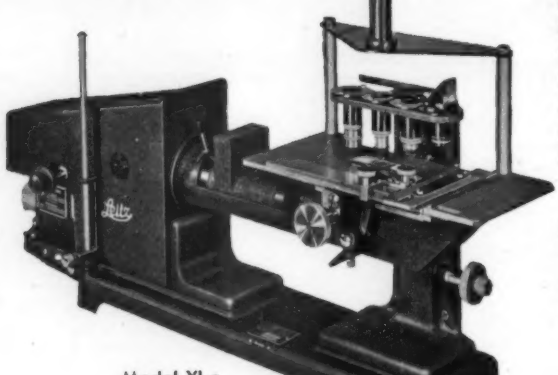

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Association Business

AT CLEVELAND last December, the Council discussed ways and means of keeping itself and the members of the Association better informed about Association activities, and it was the consensus that more extended use should be made of SCIENCE for this purpose. To some extent this is done under the caption of Association Affairs, where announcements of meetings may appear to be the major concern of the administrative staff. That this is but a single facet of AAAS activity will be evident from a résumé of the business transacted at the meeting of the Executive Committee on April 7–8.

The Council's vote on the resolutions relative to the use and continued training of scientific and technological manpower (*Science,* **113**, 3 [March 16, 1951]) was reviewed, and further action was considered, particularly in view of current efforts on the part of several Congressmen to annul orders to draft boards to defer students on any basis of selection. Just what scientists can do to educate a segment of the public and some Congressmen to the point of recognizing the value of training in this modern world is problematical, but at least scientists as citizens can be as vocal as this species of agnostic.

Association finances were found to have been healthy in 1950, but increased costs and smaller advertising volume in SCIENCE were noted as factors that will cut the margin between income and expenditures substantially in 1951. The Executive Committee authorized publication of the auditors' statement for 1949 (*Science,* **113**, 563 [1951]), which, though a year old, parallels the 1950 situation closely.

Committee personnel for 1951 was confirmed, and committee reports were presented. Reporting for the Committee on Affiliation and Association, Dr. Soule recommended that the American Geophysical Union, the American Political Science Association, and The Nature Conservancy be accorded affiliated status; the American Society of Medical Technologists, associated status. This brings to 223 the number of organizations affiliated or associated with the AAAS.

Plans for the Philadelphia meeting in December were surveyed, and action was taken to assure appointments of a general chairman, local committees, and a symposium committee. Looking into the future beyond the St. Louis meeting of 1952 and the Boston meeting of 1953, the Executive Committee authorized a detailed survey of San Francisco as a possible locale for the 1954 convention, subject to the approval of the Executive Committee and Council of the Pacific Division. Chicago was placed under active consideration for 1955; New York, for 1956.

Approval was given a new constitution and bylaws for the Lancaster (Pennsylvania) Branch of the AAAS, and hearty endorsement was accorded well-formulated plans submitted by the scientists of Alaska to create an Alaska Division of the Association, with immediate recognition of the Cook Inlet and Arctic branches. The proposed division wishes to organize a second Alaskan Scientific Conference to be held in September, and the National Research Council, which called the first Alaskan Scientific Conference in Washington last year, and the Arctic Institute of North America will cooperate in the development of the program. Not only was regional expansion of Association interests a subject of discussion; the organization of a Section (P) on Industrial Science was looked upon with favor, too. The American Industrial Hygiene Association, a recent affiliate, has taken the initiative in seeking the establishment of such a section, which will, it is hoped, embrace industrial research activities in every field. If the Council approves, the Association may finish 1951 one section and one division greater.

The Executive Committee's next meeting will be held on the campus of Indiana University on June 30 and July 1.

HOWARD A. MEYERHOFF
Administrative Secretary, AAAS

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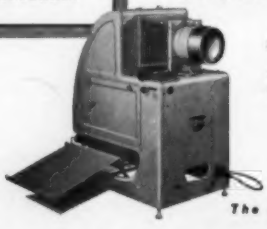

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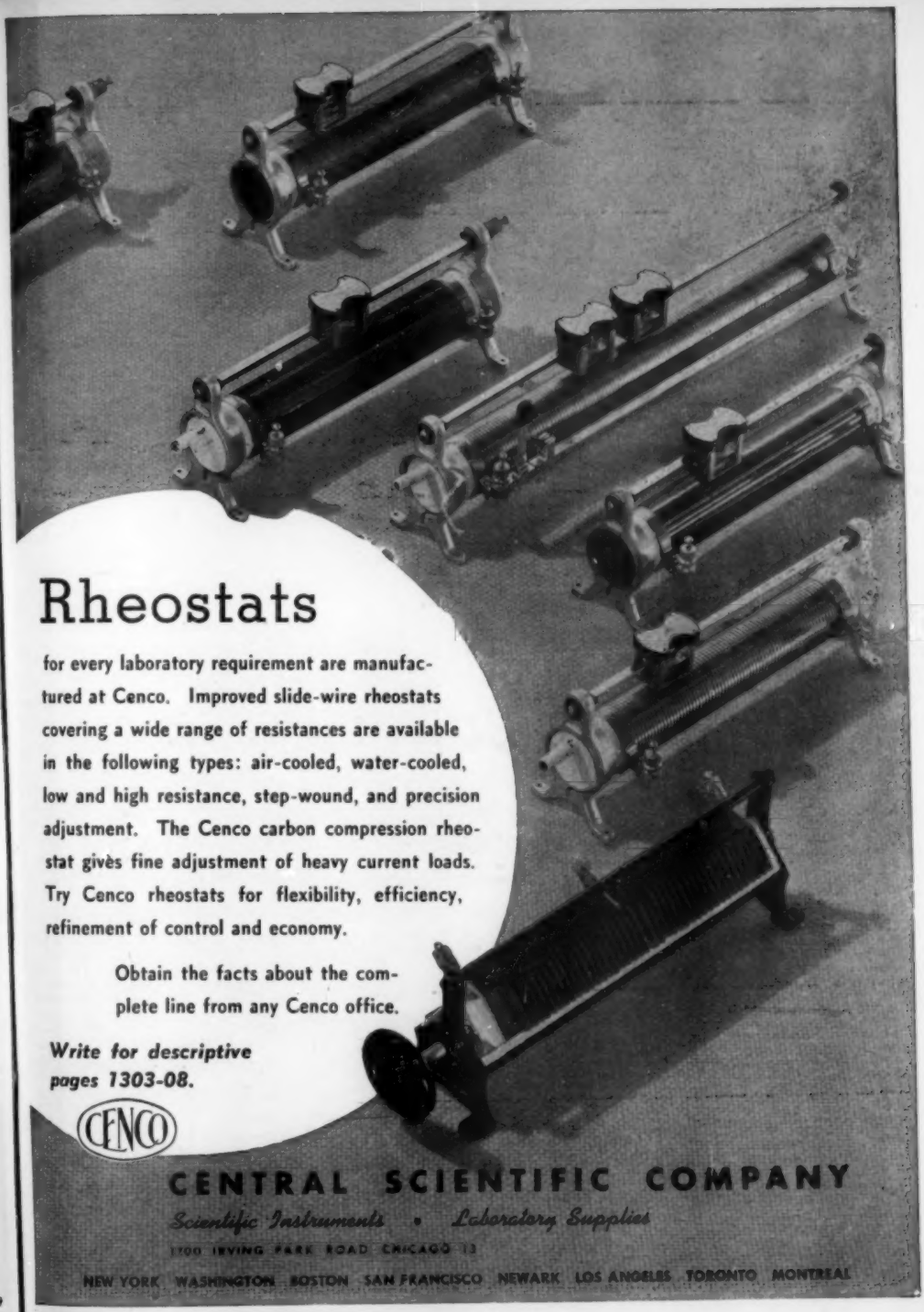
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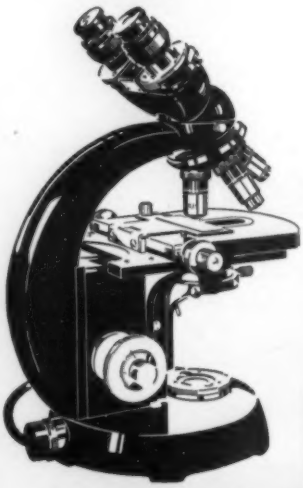

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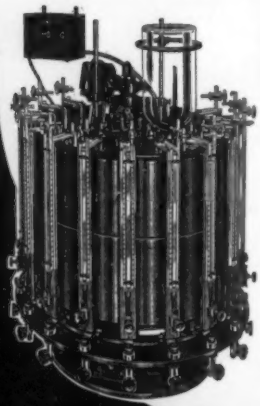

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2415	Syringe Pipette Control with Lucoflex Adaptor. Cap. 1 ml. (Carton of 6)	4.00	21.60
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Copyright and the Right to Credit[1]

Ralph R. Shaw

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LITERARY PROPERTY consists of the right of first publication, known as "common-law literary property," and the statutory right to control public use after the first publication. It is of concern not only to authors, publishers, and copyright lawyers, but to the scholarly public as well. At meetings of scientists, humanists, librarians, and other users of recorded knowledge—in fact, wherever communication of any kind is discussed—questions about literary property soon come to the fore. When these questions arise, argument and frustration almost inevitably follow, for, as pointed out by one eminent jurist, copyright is the "metaphysics of law."

Certainly there are great difficulties in determining just what the law is. Individuals differ on many points; lawyers disagree; the courts appear at times to contradict each other and, in some cases at least, to disregard principles previously established by higher courts. In addition, there are many points of the intent and application of both common-law literary property and of statutory copyright that have not been interpreted by the courts.

The heights to which confusion may rise in this field are indicated by the seeming paradox that, whereas publication without notice dedicates a book so published to public use, a book that is printed and bound, and that bears no notice of copyright, may, in fact, never have been "published" and may therefore be protected by the common law. Thus, lack of notice alone is no guarantee that a book is in the public domain. Since deposit is not required to secure copyright, failure of the Copyright Office records to show registration is no guarantee that a printed book is not protected as literary property.

On the other hand, a book bearing the copyright notice in the name of the publisher may, under the theory of "beneficial interest," actually be the literary property of the author—whose name, as will be shown here, need not even appear in the book—and the publisher, who is the legal owner of the copyright, may be an infringer of the copyright he legally owns.

In view of the present state of confusion in the protection of literary property, it appears to be only a matter of time until fundamental rethinking of the nature and scope of literary property will become essential. When that is done, a number of aspects of this field that are of great importance to scientists and to other scholars should receive thorough consideration.

The failure of both our common law and our statute to recognize the right of an author to receive credit for what he has created constitutes a serious gap in the protection of literary property. As pointed out by the Illinois Appellate Court, in 1948, in the case of *Morton* v. *Raphael* (*1*, 208–10) an ". . . author has no inherent right to have his name used in connection with his work, his name may be wholly omitted from the work, if the proprietor of it sees fit to do so. . . ." In so speaking, the court merely followed the precedents set for it by other authorities, both in the field of common-law literary property and in the field of statutory copyright. Thus, in the case of *Vargas* v. *Esquire* (*1*, 223–4), the Seventh Circuit Court of Appeals said, in 1947, that Vargas had no right to have his name used in connection with his drawings, and the "Vargas Girl" became the "Esquire Girl." This pattern of decisions was firmly established at least as far back as 1915, when the Appellate Division of the New York State Supreme Court said, in *De-Bekker* v. *Stokes* (*1*, 262) "The plaintiff was not entitled to have his own name appear in the book." In the motion-picture industry, too, there is evidence that the right of an author to credit depends upon some specific act in addition to creation, for it is stated, in *Harris* v. *Twentieth Century* (*1*, 263), that failure of a contract to include the right to screen credit divested the plaintiff of "all rights generally known as the moral rights of authors, which rights include the right to credit as author of a work."

The basic requirement of authors for a right to credit for what they have created was well stated by Judge William Seabury, in 1910, in the case of *Clemens* v. *Press Publishing* (*1*, 20–21):

> Even the matter of fact attitude of the law does not require us to consider the sale of the rights to a literary production in the same way that we would consider the sale of a barrel of pork. Contracts are to be so construed as to give effect to the intention of the parties. The man who sells a barrel of pork to another may pocket the purchase price and retain no further interest in what becomes of the pork. While an author may write to earn his living and may sell his literary productions, yet the purchaser, in the absence of a contract which permits him to do so, cannot make as free use of it as he would of the pork which he purchased. The rights of the parties are to be determined primarily by the contract which they make, and the interpretation of the contract is for the court. If the intent of the parties was that the defendant should purchase the rights to the literary property to publish it, the author is entitled not only to be paid for his work but to have it published in the manner in which he wrote it. The purchaser cannot garble it or put it out under another name than the author's, nor can he omit altogether the name of the author, unless his contract with the latter permits him to do so.

The position of an author is somewhat akin to that of

[1] Extracts from *Literary Property in the United States*. Washington, D. C.: Scarecrow Press (Dec. 1950). Copyright 1950, by Ralph R. Shaw.

an actor. The fact that he is permitted to have his work published under his name or to perform it before the public necessarily affects his reputation and standing and thus impairs or increases his future earning capacity . . . .

However clearly this may define the concept of the right of authors to receive credit for their writings, it was merely the minority opinion of Judge Seabury, for the majority of the court took the opposite position, stating: "Title to the manuscript having passed by the completed contract made on August 3, 1909, the defendant was not obligated to publish it at all, nor could plaintiff compel or prevent its publication with or without his name. The objections, refusals, and wishes of the plaintiff after parting with the title in the property may betray the eccentricities of the author; but they have no greater weight in law than the wishes of a stranger to the transaction after it was consummated."

From the cases cited above it appears that the courts, both state and federal, have ruled quite consistently that an author has neither a common-law nor a statutory right to have his name reproduced in connection with his writings. There seems to be no case, except for the minority opinion of Judge Seabury, which even approaches recognition of the right of an author to receive credit for what he has created. Yet the right to receive credit for his writing may well be a more potent incentive to publication, which is the objective sought by the constitutional grant of copyright, than is the right to share in the direct monetary earnings that may result from the sale of published copies of the author's work.

The reason for the failure of the common law to protect the right to credit probably reflects the fact that, when the common law was first interpreted, and when its precedents were being formulated, the pattern of publication was quite different from the present one. In the early eighteenth century, when Anglo-Saxon civilization progressed to the point of recognizing and protecting literary property, there were few scientific journals. The writings to be protected were not primarily scientific communications, which are written, in large measure, for the purpose of advancing civilization. When our concepts of literary property rights were evolving, the thing to be protected was predominantly the book or pamphlet written for sale and published for profit.

As the types of contributions to knowledge and their various forms of expression have multiplied, the courts have attempted to fit the concepts of another day, which still underlie both common-law literary property and statutory copyright, to modern conditions. However, the problem of the right of authors to receive credit for what they have created appears to be one of the many areas that have been neglected.

The right to credit—i.e., the right to receive recognition for constructive contribution to the written record of science—is a very important one. Publication of contributions to knowledge is the only form of advertising considered ethical among the professions. Although the man who writes a book may expect or hope for monetary profit, that is seldom true of contributors to American scholarly periodicals. In our modern civilization, with probably as many as 50,000 scholarly journals, few of which pay their contributors, the only compensations an author receives from making his writings available to the world are the satisfaction of contributing to knowledge and the investment in his professional future, which results in stimulation of his professional advancement or recognition of his contribution. If his name need not be included, the incentive for publishing scientific literature would be greatly reduced.

All of this, of course, seems fairly academic, because rarely would a publisher of a reputable scientific periodical want to omit the name of the author of any of its articles. The reputations of its authors build the reputation of the journal. There are, however, two respects in which this concept of a "right to credit" might be of vital importance to scholars.

The less important of these deals with the right to credit in quotations from an author's text. If the right to credit were recognized in law, then failure to credit the source would be a violation of law, instead of being merely bad manners, and the situation would be rapidly improved. The more important aspect of the right to credit, however, is that it may be in direct conflict with the right to restrict or control distribution, which is inherent in both common-law literary property and in statutory copyright.

Periodical articles, which are published by the tens of thousands, are not often protected in the name of the author. If they are protected by statutory copyright at all, it is in the name of the publisher. The commercial publisher's interest in publication is the sale of copies of the entire issue or volume for profit. If he does not sell copies at a profit, he will soon be a bankrupt ex-publisher. The author, however, may be interested in the widest possible dissemination of his writings, and if someone were willing to reprint 10,000 copies of his article for free distribution, that would provide a great additional profit to the author in terms of professional credit. In such a case, the author's judgment must be conditioned by the fact that, if enough articles were reprinted from any journal, it might reduce the sale of the journal to such an extent that there would be no journal in which to publish.

Of course, such a contingency seems very remote. Scholarly journals generally provide reprints to the author. Since the number of reprints is ordinarily limited only by the number the author wants and is able to pay for, there appears to be no evidence that reprinting of articles reduces the sale of journals; on the contrary, there is some evidence that it may increase the sale of journals by providing samples of their content to a wider public.

Since both the common-law literary property and statutory copyright are clearly for the benefit of *authors*, and the rights of proprietors and publishers are secondary and derived from the rights of authors,

the principle of the right to credit should receive recognition, even if there were evidence of some conflict between that right and the needs of publishers.

In the present state of the common-law literary property and of statutory copyright, it is quite clear that authors do not have the right to require that their names be published in connection with their writings. In those cases in which a contract is involved—which is not normally the case in any formal sense when contributions are sent to scholarly periodicals—the contract can protect this right. When no formal contract is involved, the author appears to have no recourse, under the present state of the law, if his article is published without his name.

The right to credit is important, and if revision of our literary property laws to meet twentieth-century conditions is ever undertaken, this right should receive serious consideration.

Reference

1. SHAW, R. R. *Literary Property in the United States.* Washington, D. C.: Scarecrow Press (1950).

The Hall of Fame

Bertha L. Lyons, *Curator*
Hall of Fame, New York University

JOSIAH WILLARD GIBBS, a physicist and one of America's outstanding scientists, has just been honored by election to the Hall of Fame, and honored by a majority of lay persons, in no way connected with science. We say by a majority of lay persons, because the Electoral College of the Hall of Fame includes only nine scientists out of the total of 113 distinguished men and women from every walk of life who cast ballots in the election of 1950. In this election a majority vote was the requisite for inclusion in the Hall, and Gibbs received 64 votes. The votes recorded for the other candidates chosen were as follows:

William Crawford Gorgas	81 votes
Woodrow Wilson	77 "
Susan B. Anthony	72 "
Alexander Graham Bell	70 "
Theodore Roosevelt	70 "

The origins of the Hall of Fame are closely allied with the growth and development of New York University, which had bought a tract of land in the Bronx, now known as University Heights, for the establishment of an uptown campus. In 1896 the Gould Memorial Library, the Hall of Philosophy, and the Hall of Languages were planned. When the drawings for these buildings were submitted to the University Council, an architectural relief and foreground were suggested, which subsequently took the shape of the Colonnade, which now half encircles the three original buildings. This was a costly bit of architecture to a university not heavily endowed; hence Henry Mitchell MacCracken, then chancellor, had to make it functional, and this he did by making it an American citadel of fame. He immediately enlisted the interest of Helen Gould (later Mrs. Finley J. Shepard), and through her generosity the Hall of Fame was built; it was officially dedicated in 1901. It is not alone a monument to the architect, Stanford White, but it is today a national institution, for the cultivation of our traditions in a time when they are being attacked from within and without, by exalting those who founded or sustained our nation.

"Every American is a shareholder in the Hall of Fame" literally and figuratively, for, in the elections, any American citizen may propose the name of a man or woman who was a citizen of the United States, and who has been deceased twenty-five years or more. Nominations are called for on April 1 preceding an election year, and close on April 1 of the election year. Elections are held every five years.

New York University, through its senate, administers the affairs of the Hall of Fame, but only in the capacity of trustee for the nation. No one connected with the university has a voice in the elections, the choices being entirely in the hands of the Electoral College, which is made up of eminent men and women, from every state in the union and from every field of endeavor, who give their services to the university. The electors are permanent choices, made by Ralph W. Sockman, director of the Hall of Fame, and ratified by the University Senate. Since the elections take place only at five-year intervals, the Electoral College is constantly being reinforced by new members to replace those electors who pass away or who find it necessary to resign.

The nation really owes a vote of thanks to the men and women who, through the years, have served as electors, for their appraisal of the nation's great. We are constantly being asked by the public, "What is an elector's yardstick of fame or greatness?" At first blush, this would seem to be a fairly simple question, but when one sees some of the names hopefully submitted by the public for inclusion in the Colonnade, one wonders! A former elector, Henry van Dyke, once briefly defined fame as ". . . a durable good renown, earned by service, approved by the wise, and applauded by the common voice. . . ." Dr. van Dyke added, "The electors are not chosen to confer

fame, but only to recognize it. For this they have need of observation, judgment, patience, and an open mind."

In studying the votes of the more recent elections, and particularly those cast for Gibbs through the years, it is interesting to note that he received but nine votes in 1920, the first time his name was submitted. Again, in 1935, he received 55 votes, but in 1945 the number dropped to 36. Several other candidates, like Gibbs, men of great distinction, have had comparable fluctuations in the votes by the electors through the years. As with actors on the legitimate stage and on the radio, the difficulty lies in the somewhat ephemeral character of even a great reputation. The progress of one generation sometimes obscures or outdates the achievements of a former one—a consideration that does not hold as frequently in the case of authorship or of art, where the record is more obviously and permanently made. Certainly a scientist like Gibbs, or a physician like Beaumont or McDowell, has made his record, and is it not logical to expect an organization such as the American Medical Association or some other scientific body to herald the achievements of those within its own ranks? In these days of expanded public relations and noteworthy inventions, we are under obligation to many persons for devices of large usefulness, but where the scientist or the inventor happens to be a very modest individual, as in the case of Gibbs, his work is often obscure, especially to laymen.

In the past twenty years, the public has become quite vocal in the elections, and organized groups have enthusiastically endorsed their particular candidates. The electors of the Hall of Fame are performing a national duty, and in view of this, the university has had no hesitancy in making known to the public the names and addresses of the men and women serving as electors. Many expressions of opinion concerning candidates have been sent to the electors in recent years by individuals throughout the country. What effect these have had upon the electors, those who administer the elections of course have no means of knowing. An interesting case in point, however, was the candidacy of Thomas Paine in 1945. Through the years, Paine received the following votes: In 1920, when he was first considered, 32 votes; in 1925 his name was not on the ballot. In 1930, he was again proposed, and received 36 votes; in 1935 his popularity diminished to the point of only 15 votes; in 1940 he received 50 votes, and in 1945, the year of his election, he received 51. In 1945, while his name was being considered, a well-financed campaign was organized for his election, the details of which may be obtained by referring to a volume entitled *Public Relations in Action*, by Philip Lesly. Every device of press and radio was employed, but despite all this propaganda, he received only *one* vote more than he received in 1940. It might also be pointed out that early in 1945, before the electors voted, the three-fifths vote that was mandatory for a number of years, was changed by the senate to a majority. Had it not been for this change in the ruling, Thomas Paine, along with Walter Reed and Sidney Lanier, would not have been elected that year. These facts are mentioned to illustrate how the electors are affected by propaganda.

The university has never attempted to influence in any way the opinions of the respective electors—our position being strictly neutral. The public seems to feel, however, that the electors should be apprised of the merits of a particular candidate, and, since we are a national institution, we feel that all citizens must have an opportunity to be heard. Like a good jury, the electors of the Hall of Fame have consistently performed a difficult role judiciously. They must be of the opinion of Dr. van Dyke, who concluded his address on "Fame" with these words: "May no names be written on these walls [The Hall of Fame] except those that are lovely and of good report—names of men and women who have served humanity in their day and generation and deserved well of the Republic."

Technical Papers

A Simplified Silver Impregnation Method for Vaginal Smears[1]

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The vaginal smear method for the diagnosis of carcinoma of the uterus was introduced by Papanicolaou and Traut in 1943 (*1*). Since that time many published reports (*2*) indicate the usefulness of this method as an aid in the detection of uterine cancer. The almost universal adoption of the stains and method so carefully developed by Papanicolaou (*3*) has undoubtedly resulted from the desire of most workers to apply the originally described diagnostic criteria for malignancy. This adherence to the original staining method has permitted a standardization of technique and facilitated teaching of the cytological method, but it has tended to discourage the application of other histological methods.

Recognizing that the most important cytological criteria for malignancy were based upon nuclear characteristics, the authors concentrated their efforts upon the development of a technique that would readily expose the chromatin elements of the nucleus. A pre-

[1] This study has been supported by a grant from the Faculty Research Fund, University of Michigan.

liminary description of a silver impregnation method was reported by this laboratory in 1948 (*4*). This method was based on the more complicated diammine silver carbonate reticulum method of del Rio Hortega. Subsequently, the technical details have been improved and standardized as outlined below.

Preparation of vaginal and cervical smears: Using a saline-moistened cotton applicator, a sampling of exfoliated cells is obtained from (1) the posterior fornix of the vagina and (2) the cervical os at the squamocolumnar junction. The smear is made by rolling the applicator over the surface of a clean microscopic slide.

Fixation of smears: The smear, while still moist, is immersed in 20% formalin (1 volume formaldehyde diluted with 4 volumes distilled water) for at least 15 min. The smears may be allowed to dry following fixation or carried directly to the next solution.

Staining procedure:

1. Rinse smears in ammonia water (5–6 drops ammonium hydroxide in 100 ml distilled water).
2. Rinse successively in 2 jars of distilled water.
3. Impregnate with a medium strength silver carbonate solution for 2–3 min. This dilution of silver carbonate is prepared by adding 1 volume of stock solution to 1 volume of distilled water. The stock solution is prepared as follows: To 100 ml 10% silver nitrate add 300 ml 5% sodium carbonate. Then carefully add ammonium hydroxide drop by drop (about 10 ml) with constant shaking until the precipitate is just dissolved. An excess of ammonium hydroxide will reduce impregnation and should therefore be avoided. This solution should be stored in a brown glass bottle.
4. Remove excess silver carbonate solution by touching edge of slide to absorbent paper and reduce in 1% formalin (1 ml 40% formaldehyde diluted with 39 ml distilled water) for 1 min. Although not a necessary part of the procedure, a lighter background and one with few particles of reduced silver will be obtained if the formalin solutions for fixation and reduction are buffered to a pH of approximately 7. The authors use one of the phosphate mixtures tabulated by Hawk, Oser, and Summerson (*5*) to dilute Merck's reagent quality formaldehyde.
5. Rinse thoroughly in distilled water and examine under the microscope for staining quality. In the event that a heavier impregnation is desired, cover the slide again with silver carbonate solution for 2–3 sec, reduce once more in 1% formalin, and rinse in distilled water.
6. Dry in air or by rinsing successively in 90% and absolute alcohol, rinse in xylol, and mount in clarite or Canada balsam.

In this laboratory the routine evaluation of more than 3,000 cervical and vaginal smears has been accomplished without clearing and mounting (Step 6). These final steps in the procedure have been reserved for a few smears which proved unusually difficult to evaluate and for those preparations from which photomicrographs have been made.

The most practical method for applying the silver carbonate solution is as follows: Place slides face up on parallel glass rods over any convenient collecting vessel (a commercial-type staining rack is available). Pour a small quantity of solution into a funnel with filter paper in place and successively flood each slide.

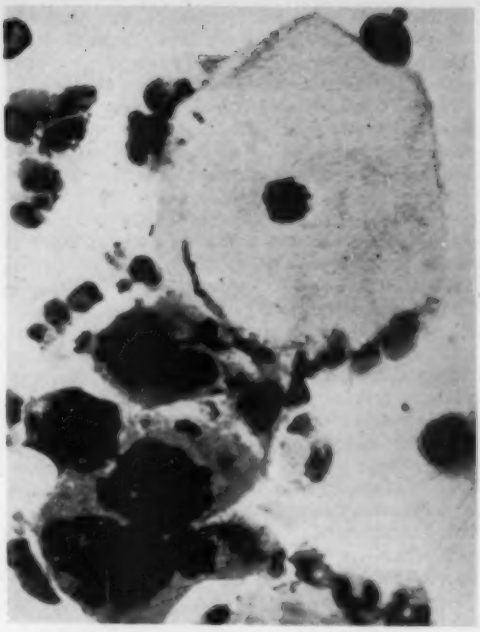

FIG. 1. Silver impregnation of a small cluster of malignant cells in a case of poorly differentiated squamous cell carcinoma. A large normal superficial squamous cell lies between the abnormal cells and a small, malignant cell. (×975.)

All the cellular components of the vaginal smear are readily identified following impregnation with silver. These elements may include the various types of epithelial cells from the vagina and uterus, leucocytes, vaginal flora, pathogenic organisms such as yeast mycelia, spermatozoa, and occasional erythrocytes. The red blood cells are usually hemolyzed in the aqueous formalin solution and are encountered only in preparations that have been inadvertently dried before fixation.

In general, the nuclear chromatin of epithelial cells appears intensely black following impregnation with diammine silver carbonate. The color of the cytoplasm will vary from pale yellow to dark brown. Malignant cells are usually recognized with ease because of the fact that their abnormal nuclei become deeply impregnated (Fig. 1).

Not infrequently the nuclei of normal, and especially malignant, cells are so heavily impregnated with the silver solution in the routine procedure that they appear as solid, amorphous elements. This condition obscures the details of chromatin distribution and nucleoli status within the nucleus. In any instance where a careful study of these elements is indicated, it has been found very helpful to immerse the slide briefly in a 5% solution of sodium thiosulfate follow-

ing Step 5. With a little experience, this procedure will result in a demonstration of fine chromatin detail. This step is most useful in those cases where a diagnosis rests upon the condition of the nucleoli.

From September 1947 to September 1950, this method has been applied to more than 2,000 clinical cases where there was some reason to suspect the existence of carcinoma of the uterus. The accuracy of the method was found to compare very favorably with reported accuracies for conventional, polychrome methods. These statistics will be reported in detail in another communication. Preliminary studies indicate that the method can be applied equally well to centrifuged concentrates of gastric washings and secretions of the respiratory tract.

The following technical advantages for the silver impregnation method may be listed: (1) The procedure is relatively simple, rapid, and inexpensive; (2) chromatin elements are deeply impregnated with silver carbonate; (3) counterstains are not necessary; (4) the masking effect of large numbers of erythrocytes is avoided; (5) silver carbonate impregnated smears are less fatiguing to examine than polychrome-stained smears; and (6) the diagnostic accuracy of the method compares very favorably with accuracies reported for other methods.

References

1. PAPANICOLAOU, G. N., and TRAUT, H. F. *Diagnosis of Uterine Cancer by the Vaginal Smear.* New York: Commonwealth Fund (1943).
2. GATES, O., and WARREN, S. *A Handbook for the Diagnosis of Cancer of the Uterus by the Use of Vaginal Smears.* 3rd ed. Cambridge, Mass.: Harvard Univ. Press, 75–85 (1950).
3. PAPANICOLAOU, G. N. *Science*, **95**, 438 (1942).
4. YUE, H. S., *et al. Am. J. Obstet. Gynecol.*, **56**, 468 (1948).
5. HAWK, P. B., OSER, B. L., and SUMMERSON, W. H. *Practical Physiological Chemistry.* Philadelphia: Blakiston, 636 (1947).

The Use of Ultraviolet Light as a Means of Diagnosing Carnation Mosaic[1]

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Virus diseases of the carnation (*Dianthus caryophyllus* L.) recently assumed greater importance when increased efforts were made to produce virus-free foundation stocks. However, in cleaning up these stocks the recognition of mosaic symptoms is often difficult, because of the narrow leaf in many varieties and because of complications from the effects of temperature variations and nutritional disturbances upon manifestations of symptoms.

Differential stains have been used to detect the presence of viruses in other plants (*1–3*), but they have not proved satisfactory in detecting carnation mosaic. The species *Dianthus barbatus* L. (*4*) has been found to be a satisfactory symptom indicator for carnation mosaic virus, but the technique of using it consumes much time and space.

TABLE 1

THE COMPARATIVE EFFECTIVENESS OF ULTRAVIOLET LIGHT AND INOCULATION OF *Dianthus barbatus* AS MEANS OF DIAGNOSING CARNATION MOSAIC

Variety	Total no. plants tested	No. infected plants as determined by	
		Ultraviolet light	*D. barbatus* inoculation
Scarlet King	4,895	4,868	4,869
Dark Pink Virginia	928	922	925
Hercules Virginia	6,993	6,993	6,993
Donna Lee	6,602	6,593	6,593
Pelargonium	3,505	3,470	3,471
Miller's Yellow	2,941	2,939	2,939
Northland	578	577	577
Dark Pink Patrician	2,180	2,167	2,170
Frosted Pink Patrician	3,936	3,936	3,936
White Patrician	3,205	3,205	3,205
Total	35,763	35,670	35,678

MacLean and Kreutzer (*5*) reported that fluorescence in ultraviolet light offered a possible means for diagnosing potato virus diseases. The fluorescence of plant extract in ultraviolet light has been reported to reveal the presence of streak in carnation material (*6*). The same method also revealed mosaic, but it was subject to such variation that recognition was often not accurate. A modified procedure, which has proved useful in detecting mosaic virus in carnations, is reported here.

The process consists of preparing a sample of plant extract by cooking 2 g of carnation terminal vegetative shoot in 10 ml of distilled water for 45 min at 15 lb pressure.[3] The cutting is then removed, and 2 ml of *n*-butanol added to the solution. The solution is shaken vigorously and allowed to settle. A drop of concentrated NH_4OH is added to the solution to increase the pH. To detect the presence of the virus, the solution should be placed before a 250-w G-E Mazda mercury-arc lamp, type A-H4, using filter No. 41,[4] which transmits light with wavelengths between 3,253A and 4,200A. Extracts of mosaic-infected plants fluoresce a light-pink color at the interface between the water and the butanol. Solutions from virus-free plants have no similar fluorescence.

The efficiency of this technique was tested over 3 years' time by examining extracts from 35,763 cuttings from 11 carnation varieties: 4,895 Scarlet King; 928 Dark Pink Virginia; 6,602 Donna Lee;

[1] Published with the approval of the Director as Paper No. 351 of the Scientific Journal Series of the Colorado Agricultural Experiment Station.

[2] Formerly graduate assistant with grant from Colorado State Flower Growers Association.

[3] The assistance of August Mussenbrock and W. D. Holley, of the Department of Horticulture, in securing and preparing materials is gratefully acknowledged.

[4] Manufactured by Switzer Brothers, Cleveland, Ohio.

3,505 Pelargonium; 1,647 Pink Patrician; 2,941 Miller's Yellow; 578 Northland; 533 Dark Pink Patrician; 6,993 Hercules Virginia; 3,936 Light Pink Patrician; and 3,205 White Patrician.

Five test plants of *D. barbatus* were concurrently inoculated with an extract from each of the carnation plants tested, using a carborundum powder No. 320 as an abrasive. Equal numbers of plants of uninoculated *D. barbatus* were maintained as controls. Table 1 compares the results obtained with the two techniques.

These data show only very slight differences between results from the ultraviolet light test and those obtained by inoculation of *D. barbatus*. This ultraviolet-fluorescence technique has proved useful for more than 2 years in indexing carnation cuttings for foundation stock. The identity of the fluorescent material is not known. It very likely is not the actual virus, however, because the heat and butanol treatment would have precipitated any protein present during preparation.

References

1. Bald, J. G. *Phytopathology*, **39**, 395 (1949).
2. Linder, R. C., Kirkpatrick, H. C., and Weeks, T. E. *Science*, **112**, 119 (1950).
3. McWhorter, F. P. *Stain Technol.*, **16**, 143 (1941).
4. Brierley, P., and Smith, F. F. *Florists Rev.*, **99**, 30 (1947).
5. McLean, J. G., and Kreutzer, W. A. *Am. Potato J.*, **21**, 1931 (1944).
6. Thomas, W. D., Jr., and Mussenbrock, A. *Florists Rev.*, **102**, 41 (1948).

Abundance of N^{15} in the Nitrogen Present in Crude Oil and Coal

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A recent paper by White and Yagoda (*1*), disclosed an apparent correlation between the concentration of the N^{15} isotope and the geological age of the pitchblende ores. The abundance of N^{15} increased from the 0.371 ± 0.002 atom % present in the atmosphere today to as much as 0.614 ± 0.012 atom % in a uraninite sample $1{,}050 \times 10^6$ years old.

Inasmuch as no hypotheses were presented which adequately explained this correlation, it seemed of interest to us to see if this same phenomenon might apply to the chemically bound nitrogen found in crude oils and coals. If some such time scale could be established for determining the age of nonradioactive geological samples, it would be of great value to the petroleum geologist in particular.

The nitrogen samples were obtained by the conventional Dumas analytical combustion. The azotometer was then connected through a liquid nitrogen trap to the gas inlet system of a G-E analytical mass spectrometer. In all cases, the gas analyzed contained over 99% nitrogen. Trace amounts of oxygen and water were obtained in several of the samples. As also observed by White and Yagoda, a small peak at mass 30 was found, which may be attributed to $N^{14}O^{16}$.

As shown in Table 1, the percentage abundance of N^{15} in the nitrogen obtained from the organic matter in the oil and coal is essentially the same as found in the atmosphere today. In no case was the deviation greater than the probable over-all reproducibility of the experiments. The values shown in the table are the average of at least three mass spectrographic analyses on each sample.

TABLE 1

N^{15} Content of Several Coals and Crude Oils

Description	Geological age in yr ($\times 10^6$)	Atom % N^{15}
Crude oil, Leduc No. 1, Alberta, Canada	290 (Devonian)	0.3715 ± 0.0003
Crude oil, Lloydminster No. 3, Alberta, Canada	105 (Lower Cretaceous)	0.3725 ± 0.0013
Coal, Atoka formation, Seminole, Okla.	230 (Pennsylvanian)	0.3740 ± 0.0016
Coal, Frontier formation, Little Horse Creek, Wyo.	70–110 (Cretaceous)	0.3687 ± 0.0002
Cylinder nitrogen		0.3705 ± 0.0005
Comparative Data by White and Yagoda (1)		
Atmospheric nitrogen		0.371 ± 0.002
Uraninite, Wilberforce, Canada	1,050	0.614 ± 0.012

Reference

1. White, W. C., and Yagoda, H. *Science*, **111**, 307 (1950).

Internal Consistency of Determinations of Absolute Optical Configuration by the One-Electron Theory of Optical Rotation

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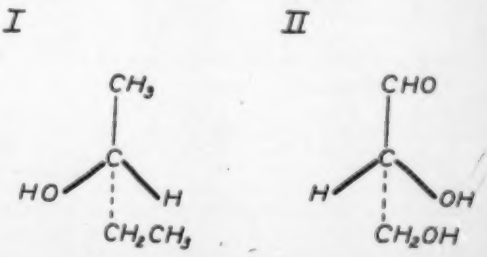
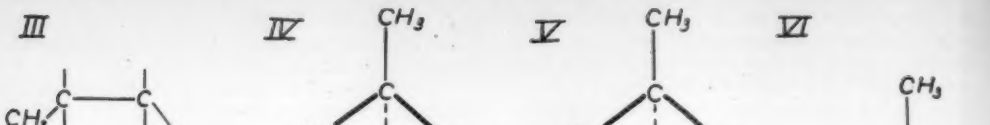
In 1938 Eyring and his co-workers (*1*) developed the one-electron theory of optical rotation and, with its aid, assigned to (−)2-butanol the absolute configuration I



an assignment which was in harmony with the traditional assumption (*2*) of II for the configuration of (+) glyceraldehyde and which agreed with theoretical treatments of this problem by Kuhr (*3*) and Kirk-



wood (*4*), but conflicted with theoretical views advanced by Boys (*5*). Shortly thereafter (*6*) the Eyring group applied this theory to the problem of the absolute configuration of (+)3-methylcyclopentanone, a more "tractable" molecule, to which they assigned the structure III.

On first sight the formulations I and III appear inconsistent, since there exist data (*7*) in the literature by which it may be shown that III must belong to the steric series, III (+ ?), IV (+ ?), V (+ ?), VI (+ ?). But (+) methylethylacetic acid has been shown (*8*) to be produced (over *s*-butyltoluenesulfonate) from I with practically certain Walden inversion!

The apparent paradox vanishes, however, on closer inspection of the detailed calculations (*6*), for it appears that in computing (*6*, p. 369) the rotatory strength,

$$R_{ba} = \mathrm{CIm}\{(\psi_{2p_y}/ex/\psi_{2s\delta_{x+y}})(\psi_{2p'_z}/m_x/\psi_{2p_y})\},$$

where

$$m_x = \frac{i\hbar e}{2mc}\left(z\frac{\partial}{\partial y} - y\frac{\partial}{\partial z}\right),$$

an error (in the sign) was made, so that this quantity should have been taken as

$$R_{ba} = \frac{+e^2\hbar}{2mc}(\psi_{2p_y}/x/\psi_{2s\delta_{x+y}})(\psi_{2p'_z}/1/\psi_{2p_z})\mathrm{C}.$$

Whence it follows that III represents not (+), but (−) 3-methylcyclopentanone.

Accordingly, III (−) becomes configurationally identical with VI (−) and I (−), which result lends strength not only to Eyring's treatment of the configurational problem, but also to the idea that the (arbitrary) stereochemical formulations now in current use are actually the correct ones. Certainly the foregoing analysis calls into question the recent sweeping statement of Turner and Lonsdale (*9*) that "At present . . . there is no sound evidence either for or against the correctness of the Fischer convention."

References

1. Gorin, E., Walter, J. E., and Eyring, H. *J. Chem. Phys.*, **6**, 824 (1938); *cf.* Condon, E. U., Altar, W., and Eyring, H. *Ibid.*, **5**, 753 (1937).
2. Fischer, E. *Ber.*, **24**, 2683 (1891); Freudenberg, K. *Stereochemie*. Leipzig: Deuticke, 662–3, 677 (1932).
3. Kuhn, W. *Naturwissenschaften*, **19**, 289 (1938).
4. Kirkwood, J. C. *J. Chem. Phys.*, **5**, 479 (1937); *cf.* Wheland, G. W. *Advanced Organic Chemistry*. New York: Wiley, 319 (ref. 97) (1949).
5. Boys, S. F. *Proc. Roy. Soc.* (*London*), **A144**, 655, 675 (1934).
6. Kauzmann, W. F., Walter, J. E., and Eyring, H. *Chem. Revs.*, **26**, 339 (1940).
7. Semmler, F. W. *Ber.*, **25**, 3513 (1892); Tiemann, F., and Schmidt, R. *Ibid.*, **29**, 903 (1896); Wolff, L. *Ann.*, **394**, 104 (1912); Kishner, N. *J. Russ. Chem. Soc.*, **43**, 955, also in *Chem. Zentr.*, **II**, 1925 (1911); Levene, P. A., and Rothen, A. *J. Org. Chem.*, **1**, 103 (1936).
8. Kenyon, J., Phillips, H., and Pittman, V. P. *J. Chem. Soc.*, 1072 (1935).
9. Turner, E. E., and Lonsdale, K. *J. Chem. Phys.*, **18**, 156 (1950).

A Special Respiratory System in Mammalian Adrenal Glands

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Mechanisms by which tyrosine or phenylalanine may be converted to adrenaline have been suggested many times, but the pathway of this oxidative conversion is as yet unknown. Coincident with this failure is the lack of any direct evidence for the presence of an active tyrosinase in mammalian tissues, although some data have been presented suggesting that such an enzyme does exist (*1*).

Since it has been shown (*2, 3*) that the production of melanin in the amphibian and the chick is brought about by the presence of neural crest derivatives in the skin, presumably by the action of a tyrosinase (*4*), the adrenal medulla, also a derivative of the neural crest, might be expected to contain an active tyrosinase. The presence of tyrosinase in this tissue has not been reported in the literature, however. It has been our experience that the addition of tyrosine to surviving slices of adrenal medulla at pH 7.0–7.5 does not result in an augmented oxygen consumption as measured in the Warburg manometer.

The lack of stimulation observed in these cases does not necessarily indicate the absence of the enzyme, but may mean that the enzyme is already saturated with substrate, so that further additions have no effect on any oxygen consumption due to this enzyme. Since the tyrosinases thus far characterized

have been copper-containing, a logical approach to this problem could be made by adding to the enzyme-substrate system a copper group inhibitor such as phenylthiourea (*5*). If this were to result in a sharp decrease in oxygen consumption, the presence of a copper-containing enzyme would be suggested. When this experiment was carried out on the male rat adrenal medulla, using the Boell-Needham ultra-microrespirometer at pH 9.5, no decrease in oxygen consumption was observed. On the contrary, when such tissue had been exposed to phenylthiourea for a time, the addition of tyrosine caused an increase in oxygen consumption that in some cases amounted to as much as 700%.

TABLE 1

THE EFFECTS OF pH ON THE Q_{O_2} OF MEDULLARY TISSUE SLICES

pH	No. animals	In the presence of glucose and phenylthiourea			
		Before addition of tyrosine		After addition of tyrosine	
		Q_{O_2}	Range	Q_{O_2}	Range
8.0	2	0.6 ± 0.1	0.5 – 0.7	0.5 ± 0.1	0.4 – 0.6
9.0	2	0.8 ± 0.1	0.7 – 0.9	2.3 ± 0.1	2.4 – 2.6
9.95	2	1.3 ± 0.2	1.1 – 1.5	13.7 ± 2.2	11.5 – 15.9
10.0	2	1.6 ± 0.8	0.8 – 2.4	13.5 ± 1.9	11.6 – 15.4
10.1	2	9.8 ± 1.0	8.8 – 10.8	13.2 ± 1.2	12.0 – 14.4
10.75	2	12.6 ± 1.0	11.6 – 13.6	9.8 ± 0.6	9.2 – 10.4

The stimulated respiration could be inhibited by boiling and has been found to have a pH optimum in the neighborhood of 10.0, although at this extremely high pH the time of activity is relatively short. The reaction does not proceed as fast but continues longer at a somewhat lower pH. There is little or no detectable activity at pH 8.0 (Table 1). Both phenylthiourea and tyrosine independently increase the oxygen consumption at pH 9.5.

These observations have been extended to include cattle and sheep, and the activity is found in the adrenal medulla of both these animals. This activity is not present in the testis or kidney of cattle.

Despite the fact that the slices used in these experiments in the Warburg manometer were between 20 and 50 mg wet weight, and that the manometric measurements were carried out under oxygen, the proportionality between the amount of tissue and the stimulated respiration was not always constant. Accordingly, it seems likely that there is yet a third substance involved in the reaction, the concentration of which within the tissue slice determines the overall rate of oxygen consumption.

The concentration of phenylthiourea may be varied within wide limits ($M/50$–$M/5{,}000$) with little effect on the total stimulated respiration, although small changes in the total oxygen consumption may appear when proportionality is established.

In an attempt to clarify the reactions involved in this system, phenylthiourea and tyrosine were added

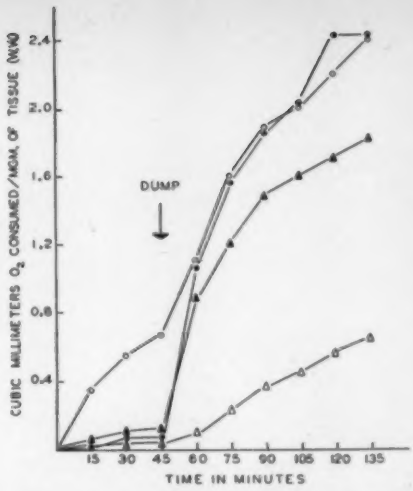

FIG. 1. The effect of the addition of phenylthiourea and tyrosine in various orders upon the oxygen consumption of adrenal medulla slices. ○——○, phenylthiourea and phosphate buffer, adding tyrosine at the dump; ●——●, phosphate buffer, adding tyrosine and phenylthiourea at the dump; ▲——▲, phosphate buffer, adding tyrosine at the dump; and △——△, phosphate buffer, adding phenylthiourea at the dump.

to surviving slices of adrenal medulla in phosphate buffer at pH 9.5, both separately and in combination. At this pH it was observed that the augmented oxygen consumption after the addition of phenylthiourea alone to slices in phosphate buffer, and that due to the addition of tyrosine alone under the same conditions, were additive (Fig. 1) and equaled the oxygen consumption following the simultaneous addition of phenylthiourea and tyrosine to the same tissue slice.

If the observed reaction is due to a tyrosinase, this enzyme must differ from any previously described tyrosinase (*6*) in that it is not inhibited by phenylthiourea or sodium diethyl-dithiocarbamate and accordingly does not contain copper.

It has been found that both the above reactions are strongly inhibited even at optimum pH with $M/15$ and $M/50$ borate buffers. No explanation for this phenomenon is known.

It seems possible, since the described oxygen consumption is located in the adrenal medulla and uses as a substrate the amino acid tyrosine, that the reaction or reactions are concerned with the physiological production of adrenaline. Analyses are in progress in this laboratory to test the validity of this hypothesis.

References

1. ONSLOW, H. *Proc. Roy. Soc. London*, **B89**, 36 (1917).
2. DORRIS, F. *J. Exptl. Zool.*, **80**, 315 (1939).
3. DUSHANE, G. P. *Ibid.*, **72**, 1 (1935).
4. CHARLES, D. R., and RAWLES, M. E. *Proc. Soc. Exptl. Biol. Med.*, **43**, 55 (1940).
5. BERNHEIM, F., and BERNHEIM, M. L. C. *J. Biol. Chem.*, **145**, 213 (1942).
6. NELSON, J. M., and DAWSON, C. R. *Advances in Enzymol.*, **4**, 99 (1944).

The Anesthetic Properties of Xenon in Animals and Human Beings, with Additional Observations on Krypton[1]

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In 1946 Lawrence *et al.* (*1*) reported the effects on mice of the inhalation of xenon-oxygen mixtures. Their observations led them to believe that the inert gas possessed narcotic properties. In addition, one of the observers reported "dizziness" on the inhalation of a 50–50 mixture of krypton and oxygen. They advanced the hypothesis that the effects observed were associated with the high fat solubility of the gases and their high oil-water ratio, and were consistent with the Meyer-Overton hypothesis. In an extensive review of the literature they report the solubility of krypton as a Bunsen absorption coefficient of 0.43 in oil at 37° C and of 0.045 in water at 37° C with an oil-water ratio of 9.6. Xenon is reported to have a Bunsen coefficient of 1.7 in oil at 37° C and 0.085 in water at 37° C with an oil-water ratio of 20.

In 1948 Lazarev (*2*) reported observations on the effect of krypton and xenon on small mice, an adult mouse, and cockroaches, which led him to believe that krypton was essentially ineffective but that xenon demonstrated conclusive narcotic properties.

Butler, in a review of the general theories of anesthesia (*3*), reported on these observations with the inert gases and stated that the evidence for anesthetic effect was inconclusive. He further stated that, "If the inert gases can be considered true anesthetics, the action of these spherically symmetrical atoms without any permanent dipoles furnishes the most conclusive demonstration that anesthesia need not depend on the effect of any specific structural grouping."

The observations incident to the experiments reported in this article support Butler's contention that the evidence for narcotic effect of the inert gases in animals is inconclusive. The evidence is much more conclusive, however, with respect to the observations on human beings.

Early in 1950, a supply of krypton 95% and xenon 5% was made available, and an 80% mixture of this gas with oxygen was given to mice, rats, and rabbits in an attempt to determine its effectiveness as a narcotic. The mice and rats were placed in a cylinder through which the mixture was moved in a circuit. Oxygen was added to compensate for that used in the metabolism of the animals, and CO_2 was removed with soda lime placed in the circuit. Each group of animals was given an 80% mixture of nitrous oxide with oxygen in the same manner. Approximately 10 mice in groups of two, and 5 rats, were used in the experiments. They exhibited no unequivocal evidences of narcosis with either the nitrous oxide or krypton mixtures. The animals were then given subhypnotic doses of Nembutal, and the experiments were repeated with no significantly different results.

In a somewhat different system, which made provision for circuit breathing, addition of oxygen, and elimination of CO_2, 12 rabbits were given inhalations of either 80% krypton with oxygen or 80% nitrous oxide with oxygen. After exposures of 15 min to each gas mixture, no unequivocal signs of narcosis could be demonstrated. The rabbits also were given subhypnotic doses of Nembutal and the inhalations repeated with no significantly different results.

Three human beings inhaled from a closed system (with O_2 addition and CO_2 elimination) an 80% mixture of krypton with oxygen and reported changes in voice quality, a sensation of wanting to breathe more deeply, a swelling of the head, and an ill-defined but unequivocal dizziness or discomfort. It was concluded that krypton under the conditions of these experiments demonstrated no significant narcotic properties.

Later a supply of 100% xenon was made available. In view of the experiences with krypton in animals, it was decided to use rabbits as the experimental animal for xenon. A closed system was arranged to permit conservation of the gas, and to this system oxygen was added (75–100 ml/min for 2.5 kg rabbit) and CO_2 removed through soda lime. Ten rabbits were given inhalations for 15-min periods of either 80% xenon in oxygen or 80% nitrous oxide in oxygen. Equivalent but minimal narcotic effects were observed in these animals. During the inhalation there was some loss of the lid reflex, some apparent diminution in response to painful stimuli, a tendency to remain in induced unnatural postures, and a slowing of the respiration. Upon discontinuance of the inhalation, recovery was almost immediate.

Three rabbits were given 0.75 mg of morphine per kg, after which they maintained their righting reflex and demonstrated prompt response to painful stimuli. They were significantly depressed, however. During inhalation of the mixtures of either nitrous oxide in oxygen or xenon in oxygen as previously described, there was an exaggeration of the signs observed in the unpremedicated rabbits. In addition, recovery was delayed for approximately 1.5 min after discontinuance of the inhalation—i.e., the righting reflex was lost, and there was more pronounced diminution in response to painful stimuli.

Six human beings inhaled either 50% xenon in oxygen or 50% nitrous oxide in oxygen from a closed system spirometer with soda lime in the circuit. Oxygen was added according to the metabolic requirements of the individual (250–500 ml/min). Pain threshold measurements were made with the Hardy-Wolff-Goodell apparatus, and there was a uniform 15% increase in the pain threshold with either gas mixture. Each subject reported more pronounced subjective sensations of dizziness and incipient loss of consciousness with the xenon mixture than with the nitrous oxide mixture.

[1] The authors are indebted to the Linde Air Products Co. for the supply of krypton and xenon.

Two of the experimenters (SCC and EGG) inhaled a mixture of xenon in oxygen (70% Xe, 30% O_2) from the same system, and each reported pronounced narcotic effects with incipient loss of consciousness after approximately 3 min of inhalation. Recovery was prompt.

As a result of these observations, it was felt that a more critical assay of the effectiveness of xenon as an anesthetic drug could be secured by its administration to a patient for an operative procedure. Accordingly, an 81-year-old man in good physical condition was given, by means of the to-and-fro CO_2 absorption technique, a mixture of xenon in oxygen in which the oxygen concentration as measured by the Pauling meter was never lower than 18%; usually it was at least 22%.

The patient was given as premedication 0.2 mg of atropine and no analgetic or hypnotic drug. In order partially to denitrogenate the patient, he was given 100% oxygen in a semiopen system for 10 min. It was felt that this process would diminish the dilution of the xenon-oxygen mixture in the closed system. Within 3 min of the beginning of the inhalation of the xenon-oxygen mixture, the patient lost consciousness, and within 10 min the operation began. An orchidectomy was performed—an operation with a high level of painful stimulus—with no evidence of reaction to pain. During the anesthetic, the rebreathing bag was emptied three times and refilled with a fresh mixture of xenon and oxygen, to compensate for the nitrogen dilution in the closed system. Evidence such as roving eyeballs, active intercostal muscles, and the character of the respiratory pattern seemed to indicate that the patient was in first-plane third-stage anesthesia (light anesthesia). No definitive measurement of muscle relaxation could be made. There was, however, sufficient relaxation of the muscles of the jaw and pharynx to require the insertion of an oropharyngeal airway to overcome obstruction to breathing by the tongue. The pulse and blood pressure remained within normal limits for the patient, and there were no unusual respiratory patterns. Color was good, as would be expected from the satisfactory concentration of oxygen in the mixture, which was at 1 atmosphere pressure (740 mm Hg).

Upon discontinuance of the inhalation of xenon and oxygen the patient recovered within 2 min to the extent that he could identify himself and within 5 min to the extent that he could orient himself accurately and clearly. The postoperative period was uneventful.

A second patient, a 38-year-old female, was also anesthetized with xenon and oxygen. She was premedicated with 0.0004 g of scopolamine. She was induced with a mixture consisting of approximately 80% xenon and 20% oxygen. Within 5 min consciousness was lost, and within 10 min the skin incision was made. At this time she did not respond by movement to the operative manipulations but was very lightly anesthetized and had some vocalization and mild laryngeal spasm. As a consequence she was given 0.050 g of meperidine intravenously. After this she did not vocalize, had no more laryngeal spasm, and appeared by all available clinical signs to be in first-plane anesthesia. On repeated checks, the inspired oxygen concentration was above 18% and, with the exception of a few minutes, was above 22%. The breathing bag was emptied several times and refilled with the xenon-oxygen mixture to eliminate the dilution effect of nitrogen, although the patient had been denitrogenated for 10 min prior to induction of anesthesia. Blood pressure, pulse, color, and other vital signs were within normal limits. Relaxation was satisfactory, but the patient had delivered a normal full-term infant 24 hr before, and the abdomen was somewhat flabby as a consequence. The operative procedure was ligation of the Fallopian tubes, and it was reported by the surgeon that operating conditions were good. Within 2 min after discontinuance of the anesthetic, the patient responded and was able to tell that she was in the operating room. In addition, upon questioning 2 hr later, she had perfect memory for statements made within 5 min after the inhalation was stopped. Recovery has been uneventful.

This is the first time, to our knowledge, that xenon has been used as an anesthetic for an operative procedure in a human being. Its effects were at least equivalent to those that could be expected from a similar concentration of ethylene. Ethylene has a Bunsen coefficient of 1.3 in oil and 0.09 in water at 37° C with an oil-water ratio of 14.4. Nitrous oxide has a Bunsen coefficient of 1.4 in oil and 0.44 in water at 37° C with an oil-water ratio of 3.2. Ether, a much more potent anesthetic, has a Bunsen coefficient of 50 in oil and 15.4 in water at 37° C with an oil-water ratio of 3.2.

Although krypton, and particularly xenon, have appreciably higher oil-water ratios, krypton appears from the observations made to have no significant narcotic properties, and those of xenon are apparently no more prominent than ethylene. However, xenon is appreciably more soluble in oil and water than krypton. Jones reports (*4*) that the solubility of gases in blood may be a significant factor in gas exchange. This function may be more important than the oil-water ratio with respect to the ability to produce narcotic effects. In addition, Tobias *et al.* (*5*) report that there may be significant differences in the absorption of gases by the different lipoids of the body, and that the effects may be a consequence of a preferential absorption in lipoids of the central nervous system. The fact that ether has an oil-water ratio similar to that of nitrous oxide but, on the other hand, a significantly higher level of solubility in oil and water lends credence to the postulate that the total concentration in blood and intra- and extracellular fluids is an important factor in the ability of anesthetics to produce their effects.

In any event, it appears that a chemically inert gas (by current standards) is capable of producing complete anesthesia, and, although it may not by virtue of its cost of manufacture prove to be a satis-

factory agent commercially, it may materially assist in solving one of the important theoretical problems of anesthesia.

References

1. LAWRENCE, J. H., *et al. J. Physiol., London*, **105**, 197 (1946–47).
2. LAZAREV, N. V., LYUBLINA, E. I., and MADABSKAYA, R. Y. *J. Physiol. U.S.S.R.*, **34**, 131 (1948). Abst. from *Leningrad Research Inst. Ind. Hyg. Fiziol. Zhur.*
3. BUTLER, T. C. *J. Pharmacol. Exptl. Therap.*, **98** (Suppl.), 121 (1950).
4. JONES, H. B. In Glasser, O. (Ed.), *Medical Physics*, Vol. II. Chicago: Year Book Pub. (1950).
5. TOBIAS, C. A., *et al. J. Clin. Invest.*, **28**, 1375 (1949).

A Simple Technique for the Identification of Raffinose and Sucrose by Enzymatic Hydrolysis on Paper Chromatograms and the Subsequent Separation of the Hydrolyzed Products by Paper Chromatography

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During studies involving the identification of sugars by paper chromatography it became necessary to verify the presence of raffinose and sucrose. The small amount of materials available necessitated a minimum amount of handling. The elution of these sugars from the chromatograms, together with their subsequent hydrolysis and concentration before rechromatographing, was undesirable. A new technique was therefore developed.

Because of the relatively rapid rate of hydrolysis of raffinose and sucrose with the enzyme invertase, it was decided to spot the sugar solution on the paper chromatogram and then superimpose the enzyme solution on the sugar spot. It was found that a microliter of solution containing 10–50 μg of raffinose or sucrose could be spotted on the paper, and partial hydrolysis of the sugar could be obtained by superimposing an equal volume of invertase solution on the sugar spot.

By experiment it was found that, if 1 μl of sugar solution was spotted on the paper, 5 μl of invertase solution immediately superimposed on the sugar spot, and the paper allowed to lie for 5 min, the hydrolysis of raffinose and sucrose was complete. The products of hydrolysis could then be partitioned as usual. The chromatographic technique was essentially that used by Partridge (*1*) and McCready *et al.* (*2*). The enzyme preparation was Difco Invertase Solution (for analytical use).[1] The chromatograms were made on Whatman No. 1 filter paper, and an *n*-butanol-ethanol-water (10–1–2) mixture served as the partitioning solvent. When the chromatogram was sprayed with the dinitrosalicylate reagent (0.5% 3,5-dinitrosalicylic acid in 5% NaOH), the melibiose and levulose from the raffinose and the dextrose and levulose from the sucrose were found to be adjacent to known pure sugars used as controls.

When the invertase solution was superimposed on only half of each of the raffinose and sucrose spots, 5 min allowed for hydrolysis, and partitioning carried out in the usual manner, additional information was obtained. When the resorcinol spray reagent (0.1% resorcinol in 0.7 *N* HCl) was used, this chromatogram revealed one half of the original raffinose spot and a part of the original sucrose spot, representing the portions of the original sugars that had not been treated with the invertase solution. In addition, levulose spots also appeared on this chromatogram as a result of the partial enzymatic hydrolysis of the original raffinose and sucrose spots. All three sugars were adjacent to known pure sugars used as controls without the addition of invertase.

This technique is being applied to sugar extracts from plant materials. It should be applicable to systems other than invertase-raffinose-sucrose.

[1] Mention of manufacturers and commercial products does not imply that they are endorsed or recommended by the Department of Agriculture over others not mentioned.

References

1. PARTRIDGE, S. M. *Nature*, **158**, 270 (1946).
2. MCCREADY, R. M., WALTER, E. D., and MACLAY, W. D. *Food Technol.*, **4**, 19 (1950).

Steroid Changes in Incubating Adrenal Homogenates[1]

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The presence of a high concentration of cholesterol in the cortex of the adrenal gland suggests an important function. It is known that under conditions of shock or administration of ACTH the adrenal cholesterol falls sharply with a concomitant increase in the release of steroids from this gland (*1*). Evidence has accumulated to indicate that cholesterol is a source compound for cholic acid (*2*), cholestenone (*3*), and progesterone. With this background it became desirable to test further the possible conversion of cholesterol to other steroids under *in vitro* conditions. The work was done throughout with whole homogenates of guinea pig adrenals. Total cholesterol was determined by a micromethod[3] devised during the course of these investigations (accuracy ±6%). Steroids were followed by use of the Zaffaroni procedure (*4*), together with the ultraviolet scanner described by Haines and Drake (*5*).

[1] The authors wish to express their appreciation to the Upjohn Company, Kalamazoo, Mich., for research grants in support of this work.

[2] From a thesis submitted by Gene F. Lata in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Chemistry in the Graduate College of the University of Illinois, 1950. Present address: Department of Biochemistry, State University of Iowa, Iowa City.

[3] To be published.

The tissue preparations were made by rapidly removing the entire adrenals from female guinea pigs and homogenizing them with sufficient chilled water in a Potter-Elvehjem homogenizer to make "15%" preparations. Four-tenths ml of such a homogenate was then incubated in a 10-ml Erlenmeyer flask at 37° C, with continuous shaking for 3 hr with the following additions: 1.6 ml of Krebs-Ringer modified buffer (pH 7.4); 0.2 ml of *ca.* 1×10^{-4} *M* cytochrome *c*;[4] 0.2 ml 0.5% DPN;[4] and 0.6 ml double-distilled water. During incubation a stream of wet oxygen was passed through the chain of flasks. Initial values were obtained by analysis of unincubated flasks, prepared as were the incubated ones, but sampled for analysis

TABLE 1

EFFECT OF INCUBATION ON ADRENAL HOMOGENATES

Description	Cholesterol (γ/flask)	Appearance of "steroid" on strip
Unincubated	1,485	Absent
"	1,640	"
Incubated	948	Present
"	948	"
"	1,070	"

immediately following the additions. In one series a portion of homogenate was heated on a steam bath for 3 min, brought to a boil, cooled, and then used in the incubation flasks as usual. The addition of α-ketoglutarate, acetate, glucose, or enolphosphopyruvate as energy sources did not lead to greater changes in total cholesterol than those reported below.

In Table 1 are shown the results of incubation of unheated homogenates. The paper strip chromatograms, all of which had been developed for 33 hr with benzene: formamide (*4*), showed, for the incubated flasks, quenching of fluorescence at a spot about 2 cm from the origin, as well as at the origin. Strips corresponding to the unincubated flasks showed only the spot at the origin.

Comparison of the chromatograms obtained with those reported by Zaffaroni (*4*) suggested Compounds E and F as two possibilities for the identity of the unknown spot. Samples of these two compounds were obtained from W. J. Haines, of the Upjohn Laboratories, and their chromatographic behavior compared with that of the spot obtained in incubated homogenates. The results of such an experiment are shown in Table 2.

There is, therefore, a 33% fall in cholesterol accompanied by the appearance of another material

[4] Unpublished results of C. S. Vestling and E. D. Nielson indicate a requirement of adrenal homogenates for added cytochrome *c* and DPN in order to get an efficient conversion of fructose diphosphate to pyruvate.

TABLE 2

Description	Cholesterol (γ/flask)	Appearance of steroid on chromatogram (distance from origin)
Unincubated	1,650	Very faint (1.5 cm)
"	1,610	" " (1.5 ")
Incubated	1,060	Clearly present (1.6 cm)
"	1,030	" " (1.8 ")
"	1,200	" " (1.2 ")
Compound E	—	Clearly present (8.5–11.0 cm)
Compound F	—	Clearly present (1.5–4.5 cm)

tentatively identified as a steroid in larger quantities than present in the unincubated adrenal preparations. When the paper strips were treated with ammoniacal silver nitrate (*4*), a faint darkening was obtained at the same positions that were seen to quench fluorescence.

To test the enzymatic nature of these changes, the incubations were repeated, using heated homogenates. The results of such an experiment are shown in Table 3.

TABLE 3

Description	Cholesterol (γ/flask)	Appearance of steroid on chromatogram
Unheated, incubated	637	Present
Unheated, unincubated	800	Absent
Heated, incubated	846	"

The data clearly show a disappearance of cholesterol under the conditions described and are suggestive of the elaboration of a Compound F-like substance accompanying this change. The changes observed are presumably enzymatic and take place under oxidative conditions, comparable to those employed by Sweat, Samuels, and Lumry (*6*) in their work on testosterone conversion. It is emphasized that the steroid elaborated has been characterized so far only by comparison of its chromatographic behavior with known Compounds E and F, upon which basis it resembled the latter. The possibility of an unknown steriod showing chromatographic behavior similar to that of Compound F is, of course, not to be excluded at this time.

References

1. SAYERS, G., and SAYERS, M. A. *Ann. N. Y. Acad. Sci.*, **50**, 522 (1949).
2. BLOCH, K., BOREK, E., and RITTENBERG, D. *J. Biol. Chem.*, **149**, 511 (1942).
3. ANKER, H. S., and BLOCH, K. *Ibid.*, **178**, 971 (1947).
4. ZAFFARONI, A., BURTON, R. B., and KEUTMAN, E. H. *Science*, **111**, 6 (1950).
5. HAINES, W. J., and DRAKE, N. A. *Federation Proc.*, **9**, 180 (1950).
6. SWEAT, M. L., SAMUELS, L. T., and LUMRY, R. *J. Biol. Chem.*, **185**, 75 (1950).

Comments and Communications

The Medical Sciences Information Exchange of the National Research Council

THE MEDICAL SCIENCES INFORMATION EXCHANGE was established on July 1, 1950, in the Division of Medical Sciences, National Research Council, to act as a clearinghouse for medical research in progress supported by grants and contracts. The exchange was initiated by those government agencies supporting such research in medical and allied fields, and it later developed within the Public Health Service as the Office of Exchange of Information. Placing the exchange within the National Research Council was effected to simplify the mechanism of its support by a variety of agencies and to promote its wider usefulness.

Although the exchange derives its total support from government agencies, its work has been made possible in large measure by the interest of both public and private foundations, which have from the beginning furnished material and maintained close liaison with its activities. The services of the exchange are freely available to all cooperating agencies and are not solely dependent upon financial contributions.

The functions of the exchange are defined in its charter as ". . . the accumulation, organization, analysis and distribution of information concerned with current research in medical and allied fields. Information may not be released in any form or to any person not authorized under the charter, or . . . (without) the approval of the investigators or agencies concerned."

To all cooperating agencies the following information is routinely available:

1. Amounts and sources of support for geographical areas, research institutions, their departments, and investigators.
2. Amounts and sources of support for the broad and specific areas of research listed in the subject index developed in the Medical Sciences Information Exchange.
3. Lists of investigators and institutions engaged in special types of research.

In addition, the exchange serves both granting agencies and investigators by furnishing data in a variety of ways and by bringing together related research conducted under varied auspices and at widely separated locations. Investigators are turning to the exchange in increasing numbers for information concerning possible sources of support and for knowledge of other workers with similar interests. Granting agencies are using the exchange to learn of additional investigators qualified to perform desired research and for direction to areas of investigation that have meager, or possibly no, support.

It should be emphasized that the exchange performs no publicity function and that none of its material is available for publication or publication reference. It serves only qualified investigators and agencies as a source of information concerning work in progress that may not have reached the publication stage.

The policies of the exchange are controlled by a Policy Committee composed of the heads of the granting divisions of the government agencies supporting the operation and of the Division of Medical Sciences, National Research Council. It is planned to enlarge the committee in the near future to include membership from the public and private groups. At a recent meeting of the Policy Committee it was agreed that the body of material should be enlarged to include the intramural programs of the government agencies, and steps in this direction have already been taken. Many investigators have either visited or written the office and have been placed in contact with other investigators whose interests lie in related fields of research. This has resulted in a growing trend on the part of investigators to report their work to the exchange, and it would seem that intramurally supported research in universities will thus become integrated in the program.

The summaries of research in progress upon which the exchange is based are prepared by the investigators performing the work. Each investigator is fully informed of the purposes for which his summary is requested, and his results are thus protected from premature publication or publication reference. Further, he is requested to omit confidential data and is never asked for a statement of accomplishment or progress.

Those who believe that a free interchange of scientific information is essential to scientific health and growth will have no doubt of the value of an operation that is not limited by organizational boundaries and that cuts across all administrative lines to relate research activities in even one rather ill-defined field such as medicine. And those of us who have taken part in the development of the exchange from a circulation of uncorrelated lists of awards to an organized and integrated body of information have an even deeper respect for its value and its present and ultimate usefulness.

There are today more than 3,000 active research projects recorded in the exchange. These projects encompass a representative sample of investigations supported by all granting sources except industry, which is financing considerable basic as well as applied research, and except local foundations supporting work in single institutions or within limited geographical areas. The exchange has very little information on active research conducted without the aid of some form of grant or contract funds, and it has become evident that the volume of work carried on in this way is considerable. It is recognized that the cost of research in the latter category is intangible, and, although this is not the place to discuss the form or extent of reporting, the exchange desires only in-

formation relative to the problems, investigators, and institutions involved. Indeed, all information concerning the amount of support is supplied by those agencies making the awards; neither investigators nor research institutions are burdened by inquiries of this nature.

Obviously the usefulness of the exchange will increase through the active cooperation of greater numbers of investigators and of granting agencies, and it is hoped that all granting agencies, including industry and the more restricted foundations, will join in the endeavor. Organizations and individuals interested in cooperating are invited to address inquiries to the Medical Sciences Information Exchange, NRC Division of Medical Sciences, Room 1113, Dupont Circle Bldg., Washington 6, D. C.

STELLA LECHE DEIGNAN
Medical Sciences Information Exchange

Book Reviews

Pharmacological Basis of Penicillin Therapy. Karl H. Beyer. Springfield, Ill.: Thomas, 1950. 214 pp. $4.50.

This book is concise, well documented, and describes in some detail the pharmacological basis of penicillin therapy. It is sufficiently broad to appeal to the investigator in the field of antibiotics, yet simple enough to be of interest to the casual reader of scientific literature or to the busy practitioner who is interested in the "why" of the pharmacological action of penicillin.

Seven chapters treat the pharmacology of penicillin in a logical order, beginning with the factors influencing absorption and distribution in the tissues, outlining the problems presented because of the rapid urinary excretion of penicillin, and concluding with a description of the attempts to alter this excretion through use of combinations of penicillin and carinamide. The latter studies are thoroughly discussed. Numerous descriptive figures and charts break the monotony of the printed page and contribute extensively to the value of the work. Well-chosen references following each chapter give available source material for those interested in a more extensive perusal of the subject.

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Ion Exchange Resins. Robert Kunin and Robert J. Myers. New York: Wiley; London: Chapman & Hall, 1950. 212 pp. $4.75.

This relatively brief book by two highly qualified men represents an attempt to summarize the rapidly expanding field of ion exchange with synthetic resins. With its more than 600 references it can serve as a good guide to the literature (through 1948), and the authors appear to have succeeded in their purpose to "assemble, digest and classify a sizable portion" of ion exchange information. The book will probably find many friends among people interested in the application of ion exchange to industrial processes, while those interested in research in this field may find the longer treatise edited by Nachod somewhat more satisfactory.

This reviewer feels that the chapter on ion exchange theory suffers the most from the brevity of the style. One could have wished that the authors had included in this chapter a more critical evaluation of the various theories. More information regarding their relative merits would have helped greatly to orient the thinking of those unfamiliar with the field.

As is common with first editions, the book contains a number of misprints and errors, and some special terms (e.g., "symmetry ratio," "exchange potential") are inadequately defined. However, these are not sufficient to impair the usefulness of the book to those interested in rapidly acquiring a general background on ion exchange.

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Pituitary-Adrenal Function. A symposium organized by the Section on Medical Sciences of the AAAS and presented at the New York meeting on December 28–29, 1949. Washington 5, D. C.: American Association for the Advancement of Science, 1950. 211 pp. $4.00; prepaid orders from members, $3.50.

The present intense interest in the interrelated functions of the anterior pituitary and the adrenal cortex determined the topic of this symposium of the Section on Medical Sciences of the AAAS. This book contains brief reports of nearly all the topics discussed in the meeting.

In a brief introductory chapter, G. A. Perera emphasizes that adrenal cortical secretions, like drugs, initiate no new cellular functions but act as regulating agents. Up to the present there is only a modest accumulation of fragmentary knowledge concerning the cellular functions which are regulated. C. H. Li discusses in some detail the chemistry of active peptides derived from the presumed protein hormone, ACTH, by peptic digestion. Evidence is offered for the conclusion that the peptides have an average molecular weight of 1,200 or less and an average length of 7–9 amino acids. One fraction, isolated by partition chromatography on paper, was about twice as active as

the peptide mixture. In human experiments, the peptide mixture and ACTH protein were indistinguishable in their action after equally large doses of either were administered (L. W. Kinsell *et al.*). An accurate quantitative comparison of the two in the clinic has not been made.

Physiological and pharmacological aspects of pituitary-adrenal interrelationships are discussed by B. L. Baker, F. C. Bartter with Fuller Albright and others, R. O. Greep, D. J. Ingle, C. N. H. Long, and E. H. Venning. Usually, but not always, the experimental basis for new hypotheses rather than those generally accepted is described. H. W. Deane reviews the experimental evidence for the independence of the zona glomerulosa of the rat's adrenal from anterior pituitary control.

J. W. Conn and his colleagues describe human experiments on which they base their belief that esterified cholesterol, according to its behavior in serum, is a probable precursor of cortical steroids. H. L. Mason discusses the methods he used in isolating 17-hydroxycorticosterone (Compound F) from the urine of patients who had been subjected to stress in major surgical operations or had received ACTH. Patterns of excretion of known and incompletely identified steroids of adrenal cortical origin are authoritatively described by Konrad Dobriner and his associates.

The adrenal cortical neoplasms which occur in gonadectomized mice of certain strains have been investigated for years by G. W. Woolley. Their frequency is higher in spayed females than in castrated males. Woolley is not able to report much progress in deciding whether anterior pituitary secretion is the "inciter." Pearson and his colleagues report their investigation of the effects of cortical secretions on neoplastic lymphoid tissue in one patient; however, their report appears to have little value until more observations have been made.

Some metabolic consequences of adrenal cortical secretion are considered by Engel, Gaunt, and Sprague. Engel is interested in the course of protein catabolism. Gaunt and his colleagues cautiously discuss hypotheses concerning water metabolism in relation to adrenal cortical function. Sprague and Power compare the metabolic effects of ACTH, cortisone, and Compound F in man. It is of interest that the last-named substance, believed by some to be the important steroid secreted by the adrenal cortex, had only slight metabolic effects after 900 mg had been administered to a patient over a period of 12 days.

Five communications are concerned with the effects of cortical secretions in experimental or clinical disease. The reaction of the organism to stress and its possible importance in the pathogenesis of several degenerative diseases are discussed by F. R. Skelton, an associate of Hans Selye. T. F. Dougherty describes interesting observations concerning the modification of hypersensitivity by adrenal cortical secretions. Several possible mechanisms are considered in explaining why "anaphylactogenic" substances cause less cellular damage if adequate adrenal cortical secretion is available. A. C. Corcoran, as he admits, is not able to marshal convincing evidence that the adrenal cortex is "genetically concerned" in essential hypertension in man. Some aspects of human diabetes mellitus in relation to adrenal cortical secretions are discussed by E. S. Gordon. His preliminary studies make clear the great difficulty of securing satisfying results in this difficult field of clinical investigation. In the last report, Hudson Hoagland summarizes work of himself, Gregory Pincus, and their collaborators. Hoagland concludes that in about two thirds of a group of chronic (average hospitalization: 2.5 years) schizophrenic patients, the response of the adrenal cortex to ACTH, either secreted or injected, was abnormally low. It is suggested that this finding may have prognostic value in electroshock therapy, which produced greater benefit in patients with a more normal response to ACTH.

Gordon K. Moe, responsible for the organization of this symposium, succeeded in bringing together a large proportion of the American investigators interested in pituitary-adrenal physiology. Most of these brief reports are clearly written, and the collection will be welcome as a record of viewpoints and investigative interests in 1950.

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Scientific Book Register

Parasitic Infections in Man. Symposium held at the New York Academy of Medicine, March 15 and 16, 1949. Harry Most, Ed. New York: Columbia Univ. Press, 1951. 229 pp. $4.50.

Geography of the Pacific. Otis W. Freeman, Ed. New York: Wiley; London: Chapman & Hall, 1951. 573 pp. $10.00.

Ecology of Animal Parasites. Jean G. Baer. Urbana, Ill.: Univ. Illinois Press, 1951. 224 pp. $5.00.

Stereochemistry: A Textbook of General Organic Chemistry. E. de Barry Barnett. New York: Pitman; London: Isaac Pitman & Sons, 1950. 169 pp. $4.50.

Industrial Solvents. 2nd ed. Ibert Mellan. New York: Reinhold, 1950. 758 pp. $12.00.

Elements of Modern Physics. Walter C. Michels and A. L. Patterson. New York: Van Nostrand, 1951. 659 pp. $6.50.

Formulario di Aerosolterapia. Sergio Rocchietta. Turin, Italy: Minerva Medica, 1950. 156 pp. Lire 800.

Paul Ehrlich. Martha Marquardt. New York: Schuman, 1951. 255 pp. $3.50.

Surgical Forum. Proceedings of the Forum Sessions, Thirty-sixth Clinical Congress of the American College of Surgeons, Boston, Massachusetts, October, 1950. Owen H. Wangensteen, Chairman. Philadelphia-London: Saunders, 1951. 665 pp. $10.00.

The Topology of Fibre Bundles. Norman Steenrod. Princeton, N. J.: Princeton Univ. Press, 1951. 224 pp. $5.00.

Bases of Human Behavior: A Biologic Approach to Psychiatry. Leon J. Saul. Philadelphia-London: Lippincott, 1951. 150 pp. $4.00.

News and Notes

Scientists in the News

Harry G. Armstrong, Air Force surgeon general, has returned from a staff visit to Air Force medical facilities in the Far East. He was accompanied by **Albert H. Schwichtenberg,** Chief, Civil and Military Inter-Relation Division, Office of the Secretary of Defense. Civilian consultants making the trip were **Cortez F. Enloe,** internal medicine; **Elmer L. Henderson,** surgeon and president, American Medical Association; **William P. Holbrook,** internist and president, American Rheumatism Association; **Russel V. Lee,** internal medicine; **John M. Murray,** psychiatrist; and **Herbert B. Wright,** urologist.

A. F. Dunn, of the Division of Physics of the National Research Council of Canada, is spending approximately a month and a half with the Electricity Division of the Bureau of Standards, studying methods for making fundamental electrical measurements. Other recent visitors at the Bureau were **B. M. Crowther,** editor of *Science Abstracts,* London, and **George K. Batchelor,** professor of applied mathematics, Trinity College, University of Cambridge.

Paul D. Foote, vice president of Gulf Oil Corporation in charge of research and development, has been presented with the Outstanding Achievement Medal Award of the University of Minnesota. The honor, reserved for former students who have attained high eminence and distinction, was conferred as part of the university's centennial observances during the dedication of new social science and liberal arts buildings. Dr. Foote, who received his Ph.D. in physics from the university in 1917, is a member of the Ordnance Advisory Committee of the Research and Development Division, Department of the Army, and of the Naval Ordnance Laboratory Advisory Board.

Ernest K. Gladding is retiring as director of the Du Pont Company's Development Department, and **Henry E. Ford,** who has been assistant director of the department since 1942, will succeed him. Dr. Gladding has been with the company 41 years, starting as a chemist in the Eastern Laboratory of the Explosives Department at Gibbstown, N. J. He became manager of the nylon division of the Rayon Department when that division was formed in 1938. From that time until he entered the Development Department, he guided research on nylon. Mr. Ford started with Du Pont in the Explosives Department immediately after his graduation from the University of Pennsylvania in 1922, joining the Development Department in 1939.

Carl-Erik Groth, until recently head of the Swedish field hospital in Pusan, which he organized and led since its inception, has been awarded the golden Cross of Honor of the Association of American Military Surgeons, at the same time being appointed an honorary member of the association. The award was made by General **Edgar E. Hume,** chief American military surgeon in the Far East.

John Hardy, director of one of Shell Chemical Corporation's agricultural research laboratories, has been flown to Iran to aid in the fight against the locust plague now threatening that country. Dr. Hardy will help direct the application of aldrin, a new insect toxicant, on request of the U. S. State Department.

Elvin A. Kabat, associate professor of bacteriology, College of Physicians and Surgeons, Columbia University, was selected to give the Ninth Harvey Lecture at the New York Academy of Medicine, on the subject "Immunochemistry of the Blood Group Substances."

Mervin J. Kelly, executive vice president of Bell Telephone Laboratories, has been elected president, succeeding **Oliver E. Buckley,** who has accepted an appointment by President Truman as chairman of the newly created Science Advisory Committee of the Office of Defense Mobilization. Dr. Buckley has been elected chairman of the board and will continue his association with the Laboratories in this capacity.

Fred H. Klaer, Jr., of the Ground Water Branch, Water Resources Division, USGS, and for the past nine years geologist in charge of ground-water investigations in Indianapolis, has resigned to accept a position with the Ranney Well Construction Company, Columbus, Ohio. **Gordon E. Davis,** engineer, is in charge of the Indiana work at present.

Among the six recipients of awards at the recent Boston meeting of the American Chemical Society, one was honored *in absentia.* He was **Edgar Lederer,** of the Institut de Biologie Physico-chimique, Paris, winner of the Fritzsche Award of $1,000 and a gold medal for work on essential oils.

A. William Lescohier has retired as president of Parke, Davis & Co., a post he had held since March 1, 1938. He was succeeded by **Harry J. Loynd,** who has been vice president in charge of domestic and Canadian sales and promotion since June 1945. Directors of the company also elected **Homer C. Fritsch** executive vice president.

The following Japanese personnel have been assigned to Japanese National Leader Project #199, "Training to Advisors on Flood Control—Watershed Management," sponsored by the U. S. Geological Survey: **Kiyoo Meguro,** River Bureau, Construction Ministry, chairman; **Takashi Ogawa,** Irrigation and Drainage Section, Agricultural Land Bureau, Ministry of Agriculture and Forestry; **Saburo Yamamoto,** Water Utilization Section, River Bureau; **Shigeto Fujimura,** Guidance Division, Forestry Agency, Ministry of Agriculture and Forestry; **Ichiro Yamanouchi,** Edo River Improvement Work Office, Construction Min-

istry; and **Yoshio Hosoya,** Construction Ministry. The group will be in the U. S. about three months for training on flood control and watershed management.

Albert Milzer, director of the Department of Bacteriology and Virology at Michael Reese Hospital, Chicago, was recently awarded a grant of approximately $5,000 by the USPHS to conduct studies on the development of an irradiated tuberculosis vaccine.

Robert A. Moore, professor of pathology and dean of the School of Medicine, Washington University, delivered the thirty-fourth Mellon Lecture before the Society of Biological Research of the School of Medicine, University of Pittsburgh. His subject was "The Nature of Teratomatous Tumors."

Donald E. Munnecke recently joined the staff of the Division of Plant Pathology, University of California, Los Angeles, as instructor and junior plant pathologist in the Experiment Station. His research in California, concerned with diseases of ornamental nursery crops, is part of the program of research in floricultural pathology on the Los Angeles campus.

Robert Collier Page, medical director of Standard Oil (N.J.), has been named chairman of a National Doctors Committee formed by the Citizens Committee for the Hoover Report to bestir interest in establishment of a federal Department of Health. Major objectives of the new committee are to strive for conservation and optimal use of personnel in health sciences, and to stress advantages of improved coordination of federal health and medical facilities through unification in a single Cabinet department.

Francis Perrin, professor of atomic and molecular physics at the College of France, has been named to assume the post of French High Commissioner of Atomic Energy, previously held by Frederic Joliot-Curie.

Santiago Ramos Polo, postdoctoral research fellow in the Physics Department's Spectroscopy Laboratory at the Illinois Institute of Technology, has received the annual research award of the Spanish Royal Academy of Sciences.

Nathan Rakieten, formerly director of pharmacological control at Bristol Laboratories, Inc., is now associated with The South Shore Analytical and Research Laboratory, Inc., at Islip, N. Y., as director of pharmacological research and control.

Theodor Rosebury, associate professor of bacteriology at Columbia University, has resigned to accept appointment as professor of bacteriology at the School of Dentistry, Washington University.

Hugo H. Schaefer, treasurer of the American Pharmaceutical Association, and dean of the Brooklyn College of Pharmacy, will receive the Remington Medal, which is given annually to the individual who has done most for American pharmacy in the previous year, or whose continuing contributions to the advancement of the profession have been outstanding. The past presidents of the American Pharmaceutical Association serve as the jury of award.

Sheila Sherlock, lecturer and physician in the Department of Medicine, the Postgraduate Medical School, University of London, delivered the twenty-seventh Ludvig Hektoen Lecture of the Frank Billings Foundation of the Institute of Medicine of Chicago. Her subject was "Hepatic Venous Catheterization in Clinical Research."

Helen K. Sherwood recently joined the Research Center staff of The Johns Hopkins University Applied Physics Laboratory, Silver Spring, Md. She had been with the National Electronics Laboratories, Washington, D. C.

David B. Steinman has received the Egleston Medal for 1951 from the Engineering School Alumni Association of Columbia University. The award honors the memory of Thomas Egleston, whose efforts led to the establishment of the Columbia School of Mines in 1864, and later to the development of the Engineering School. The medal was first presented in 1939.

George Stevenson, of Northwestern University's Medical School, has been appointed coordinator of the school's cancer teaching program. He succeeds **William B. Wartman,** chairman of the Northwestern Department of Pathology, who has served as coordinator since establishment of the program in 1949.

Corneille O. Strother, of the Linde Air Products Company, Tonawanda, N. Y., has been awarded the Jacob F. Schoellkopf Medal for 1951. The award was founded in 1930 in honor of Jacob F. Schoellkopf, Sr., financier, industrialist, and pioneer in the establishment of the chemical industry in the Niagara area.

Arlie C. Todd, veterinary scientist from the Kentucky Agricultural Experiment station, has been appointed associate professor of veterinary science at the University of Wisconsin to fill the position held by the late **Banner Bill Morgan.**

Henry R. Viets, librarian of the Boston Medical Library, neurologist, and chairman of the Council on Scientific Assemblies for the American Medical Association, has accepted appointment as lecturer in neurology and in historical and cultural medicine at the University of Texas Medical Branch, Galveston. Dr. Viets plans to spend a week each semester in Galveston for lectures and conferences with the staff and students.

Alexander Wetmore, secretary of the Smithsonian Institution, who will reach the normal retirement age in June, has been continued in office by action of the Board of Regents, which met May 3. A committee of the Board of Regents has been and is exploring the field for a qualified successor to Dr. Wetmore.

Colleges and Universities

Cornell University will hold an 8-week seminar, June 15–August 10, under the sponsorship of the Social Science Research Council, to investigate language learning in the child, explore the role of language in social behavior, and attempt the psychological analysis of language structure. John B. Carroll, Graduate School of Education, Harvard, is chairman of the project. Other psychologists and specialists in linguistics who will participate are: Frederick B. Agard, Cornell; Stanley S. Newman, University of New Mexico; Charles E. Osgood, University of Illinois; Thomas A. Sebeok, Indiana; and Richard L. Solomon, Harvard.

Beginning with the academic year 1951–52, **Drexel Insitute of Technology** will offer three new cooperative curricula in chemistry, physics, and the biological sciences, leading to the B.S. degree. Students in the new courses will be required to work under the institute's cooperative plan, which provides for 21 months of the five college years to be spent on the job in some industry.

The **University of Illinois** at Urbana will hold a summer education conference June 26–29 on "Education in the Present Emergency." Among participants will be: Harold Benjamin, George Peabody College; Earl D. Johnson, Assistant Secretary of the Army; William H. Perkins, retired head of the Education Authority, Warwickshire, Eng.; Eduard C. Lindeman, formerly of Columbia University; and John Lee, Wayne University. Registration is free. For further information, write to Harold T. Trimble, 109 Gregory Hall, Urbana, Ill.

Northwestern's Dental School will hold a five-day conference, June 4–8, on "A Century of Progress in Dentistry," as part of the university's centennial year celebration. Robert E. Blackwell, J. Ben Robinson, Maynard K. Hine, B. O. A. Thomas, Samuel Chase Miller, Walter McBride, Roy G. Ellis, and James Barret Brown will be among the speakers.

Fellowships

Majestic Radio and Television Corporation, 270 Park Ave., New York, has established a $500,000 fund to provide up to 48 scholarships a year for the next five years to persons over 35 years of age. To be known as "second chance scholarships," they will be granted to "worthy men and women" who may have been deprived of an education by circumstances. Scholarships will carry employment and income guarantees, and no age limit has been set. Aptitude tests are being formulated to be given to all applicants, and first awards will probably be made next fall.

Sigma Delta Epsilon, graduate women's scientific fraternity, has awarded its Postdoctoral Fellowship (open also to nonmembers) to Christine Williams Ayoub, instructor in mathematics at Cornell since 1948. Her research project is on the theory of groups and will be carried out at Harvard. Two additional research awards (for members only) will be given in 1951, one of which will be for research carried on in the home, either on the problems of housewives, or in other fields of scientific research. Mayme I. Logsdon, University of Miami, Coral Gables 46, Fla., is chairman of the awards board. Sigma Delta Epsilon celebrates its thirtieth anniversary this year, with 16 chapters, a membership of about 1,500, and a world-wide alumnae chapter.

The **Wilson Fellowship** program, begun in 1945 to aid in the education of scholars intending to enter the teaching profession, was expanded last year with the support of the Carnegie Corporation of New York. Twenty-five college seniors were awarded Woodrow Wilson fellowships from Princeton University for the academic year 1951–52, among them Naomi Paula Loeb, of Brooklyn, first woman ever to receive a Princeton fellowship. Miss Loeb is a senior in English literature at Barnard College.

The **Shell Companies'** programs in support of higher education have been renewed for 1951–52. Twelve Fundamental Research Grants totaling $60,000 were made directly to science departments in the following universities: Caltech, Carnegie Tech, Chicago, Harvard, MIT, Princeton, Stanford, and Yale. Supplementing the research grants are the 45 Graduate Fellowships, made preferably to candidates in the final year of doctorate study. These provide a stipend of $1,200 for the academic year, tuition, and fees, plus a special fund of $300 to the school itself.

Grants

The American Academy of Arts and Sciences has awarded 14 grants from its Permanent Science Fund to investigators at Harvard; Oklahoma; MIT; Tufts; Indiana; University of Oregon; University of Pisa (Italy); Free Hospital for Women, Brookline, Mass.; Mount Sinai Hospital, New York; and Yale for studies in the humanities and the natural and physical sciences.

Armour & Company has made a grant-in-aid to Albert Szent-Györgyi, winner of the 1937 Nobel prize in medicine for the isolation of vitamin C, for work in the chemistry of muscle. With seven assistants Dr. Szent-Györgyi will continue at the Marine Biological Laboratories, Woods Hole, studies he began in Hungary before coming to the U. S. in 1947.

Chicago Medical School has received a gift of a $10,000 **Subsidiary Scholarship** from Sayde Arkin in memory of her husband, Harry J. Arkin. Four subsidiary scholarships of $10,000 each have also been received from the David, Josephine and Winfield Baird Foundation, Inc., of New York City.

The Atomic Energy Commission has awarded fourteen new unclassified research contracts, six in biology and medicine and eight in the physical sciences, making a total of 385 such projects being supported by

the commission. Contracts in biology and medicine went to Michigan State (R. U. Byerrum and C. D. Ball); Columbia (Harry Grundfest); Wisconsin (Joshua Lederberg); Massachusetts General Hospital (William H. Sweet); University of Michigan (James V. Neel); Western Reserve (C. E. Carter); and in the physical sciences to: Georgia Tech (J. Hines); Iowa State (S. Wawzonek); Purdue (W. W. Brandt, T. Devries, W. F. Edgell, M. G. Mellon, W. H. Johnson); Johns Hopkins (R. D. Fowler). Nineteen existing contracts were renewed.

The Guggenheim Foundation has awarded 154 fellowships, amounting to a total of $568,000, for research in economics and political science (twenty awards); chemistry (nine); biochemistry (eleven); medicine (two); genetics (four); physics (four); mathematics (five); botany (five); biology (ten); psychology (two); and other awards in a wide variety of subjects. Investigators located in the U. S., Canada, and Latin America will benefit.

The **National Multiple Sclerosis Society** has made a one-year grant of $15,507 to the H. L. Snyder Memorial Research Foundation, Winfield, Kans., for biochemical studies under the direction of Harold H. Jones.

The American Cancer Society has presented grants-in-aid and fellowships, ranging in amount from $2,500 to $20,000 for projects in medical institutions in New York City, to thirty men and women. The society will spend more than $3,480,000 on cancer research this year; nearly 800 investigators in 95 institutions and 31 states are carrying on 250 projects under the research program.

The **Audiology Foundation** is offering a limited number of grants-in-aid to students entering into or already engaged in any branch of the science, including otology, audiometry, speech, acoustics, and education of the deaf or the hard of hearing. Apply for further information to the foundation at 1104 S. Wabash Ave., Chicago 5.

Among recent **Rockefeller Foundation** grants were $117,000 to the Conservation Foundation of New York for research on water and marine resources; $66,000 to the Institute for Urban Land Use and Housing Studies, established by Columbia University; $100,000 to the Oregon Medical School for studies in constitutional medicine; $9,000 to the International African Institute for field studies of the Fulani-speaking peoples of West Africa; $92,000, to Columbia University, $30,000 to Tufts College, and $12,000 to University College (Dublin) for biochemical and immunochemical research; and $22,500 to Dalhousie University (Halifax, N. S.) for a study of psychological factors in pregnancy and childbirth. An additional $155,000 was granted to seven institutions in the U. S. and abroad for medical research and equipment; $175,000 to fourteen institutions for research and equipment in the natural sciences; and $81,000 to six institutions for work in the social sciences.

Miscellaneous

The 1951 list of members of the **American Council of Commercial Laboratories** is free upon request to H. M. Dudley, 4302 East-West Highway, Washington 14, D. C.

An atomic energy school to teach workers how to use radioactive materials has been opened at the **Atomic Energy Research Establishment,** Harwell, Eng. The school is designed to meet the requirements of medical and industrial workers who need to learn what can be done with radioisotopes, and what apparatus and methods are necessary to deal with radioactive materials. It will give students of graduate level detailed instruction in the problems encountered when radioactive materials are used in the quantities employed in a normal laboratory. The first course, lasting six weeks, was in charge of J. E. Johnston, of Harwell's Isotope Division. Subsequent courses will last four weeks—the second and third were scheduled to begin on May 15 and June 18. Twelve students will be accepted in each.

The U. S. Department of Agriculture presented its annual **Honor Awards** on May 15 in Washington, D. C., to: Walter H. Ebling, Bureau of Agricultural Economics, Madison, Wis.; Severin O. Fladness, Bureau of Animal Industry, Washington, D. C.; Christopher M. Granger and Earl W. Loveridge, Forest Service, Washington; Carl F. W. Muesebeck, Bureau of Entomology and Plant Quarantine, Washington; and Ruth O'Brien, Bureau of Human Nutrition and Home Economics, Beltsville, Md.

The American Museum of Natural History last week opened its new Felix M. Warburg Memorial Hall, the gift of Frederick M. Warburg. In 20 sections, the museum will provide a realistic view of a portion of the Pine Plains area of Dutchess County. Louis Bromfield made the dedication address.

Near the site of its original plant along Brandywine Creek, **Du Pont** last week opened its new $30,000,000 addition to the Experimental Station, with speeches, series of special exhibits, and tours of the station. The nineteen new buildings cover an area of 57 acres, required more than two years for construction, and will house more than half Du Pont's total research personnel. The basic unit is a two-man laboratory room, $25' \times 19'$.

The first issue of the *Journal of Neuropathology and Clinical Neurology* appeared January 1951 under the editorial direction of George B. Hassin and Percival Bailey. It will carry occasional articles in allied fields such as neurophysiology and neurosurgery.

Owing to the paper shortage, some issues of **Science** for the next few months will be printed on slightly different stock, and in some cases reproduction of photographs may be rather poor. As soon as possible we hope to get back to our usual stock.

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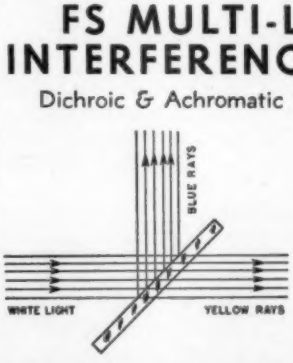

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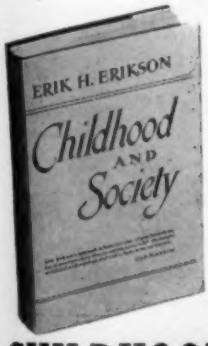

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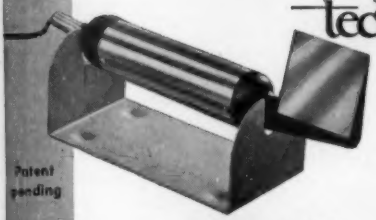

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